16869B-017410US Atty: George B. F. Yee, Reg. No. 37,478 Telephone: 650-326-2400 Cell-Level Data Access Control Using User-Defined Functions Inventors: Shinji Fujiwara et al. Sheets of drawing: 1 of 8

1500

900

1/8

200 950

<u>ĕ</u> }	AVK ST/		က)	-	J	
VOL	VOL		-	٥	1	-		
MD_ID VOL AVC		9999	1	3333		7777	<u> </u>	
PYMT	000	1200	(C i	1500		200		90/
COST	000	1000 1200	000,	1200 1500		009		200
STAY	7		,	2		က		5
DRG	123			123		2222 127		234
	3333 123			4444 123		2222		3333 234
SEX	Σ		1	ட		Σ		L.
AGE	54			25		55		65
PT_ID VST P_NM AGE SEX WD_ID DRG STAY COST PYMT		AREN		ERIS		AREN		MARY
VST		1		-		2		•
DT_ID		12345		23456		12345 2 AREN		97531

16869B-017410US Atty: George B. F. Yee, Reg. No. 37,478 Telephone: 650-326-2400 Cell-Level Data Access Control Using User-Defined Functions Inventors: Shinji Fujiwara et al. Sheets of drawing: 2 of 8

2/8

NG.	006	950	1500	3	AVG	PYMT	500	950	1500	2	AVG F//	200	050	200	000
AVG_/		000			AVG AVG	COST	009	006			MD ID VOL AVG AVG AVG		8 8		1200
AVG	3 %) (c		1	AVG	STAY	က) (6	, ,	1	AVG	<u> </u>	ه (د		N
VOL	-	- 0	1 -	-	7))		0	1 -	-	NOL.	-	- (u ,	_
MD ID VOL AVG AVG AVG	2000	2227			4	ة آ آ		2333	0000		MD DM				4444
PYMT	1200	1500	200	700	PYMT	000	1200	1500	200	700	PYMT	1200	1500	200	700
COST	1000	1200	009	800	COST	000	1000	1200	009	800	COSTIPYM	1000	1200	009	800
STAY	7	2	က	2	STAY	1	,	8	ဗ	2	STAY	7	7	က	5
DRG	123	123	127	234	DRG		123	123	127	234	DRG	123	123	127	234
SEX MD IDDRG STAY COST PYM			2222		SEX MD ID DBG STAY COST PYMT		3333			3333	SEX MD_ID DRG STAY		4444		
SEX	Σ	ட	≥	ட			Σ	Ц.,	Σ	ட	SEX	Σ	ш.	Σ	ш
AGE	54	25	55	65	AGE		54	25	55	65	AGE	24	25	55	65
ST P NIM AGE			AREN		ST P NM AGE		AREN			MARY	ST P NM AGE		ERIS		
VST			2		VST)	-			-	VST		1		
OL 19			12345		OL TO		12345			97531	PT_ID		23456		
OI OM	2222				CI	1	3333				MD ID	4444			

FIG. 2

16869B-017410US
Atty: George B. F. Yee, Reg. No. 37,478
Telephone: 650-326-2400
Cell-Level Data Access Control Using User-Defined Functions
Inventors: Shinji Fujiwara et al.
Sheets of drawing: 3 of 8

3/8

CREATE VIEW INPT_FACT AS
SELECT (CASE WHEN MD_ID = user-id THEN PT_ID ELSE NULL END) PT_ID,
(CASE WHEN MD_ID = user-id THEN VST ELSE NULL END) VST,
(CASE WHEN MD_ID = user-id THEN P_NM ELSE NULL END) P_NM,
AGE, SEX,
(CASE WHEN MD_ID = user-id THEN MD_ID ELSE NULL END) MD_ID,
DRG, STAY, COST, PYMT
FROM INPT_BASE;

FIG. 3

SELECT MD_ID, COUNT(*) VOL, AVG(STAY) AVG_STAY, AVG(COST) AVG_COST, AVG(PYMT) AVG_PYMT FROM INPT_FACT GROUP BY MD_ID ORDER BY AVG_STAY DESC;

FIG. 4

16869B-017410US Atty: George B. F. Yee, Reg. No. 37,478 Telephone: 650-326-2400 Cell-Level Data Access Control Using User-Defined Functions Inventors: Shinji Fujiwara et al. Sheets of drawing: 4 of 8

4/8

		-	_
AVG	808		1200
AVG	2	'	0
VOL	က		-
QI QW		STORY CONTRA	4444
AVG PYMT	950		900 1000
VOL STAY COST	906		006
AVG STAY	9		2.5
VOL	2		2
MD_(D	3333		
AVG PYMT	1133		200
AVG COST	4.67 1000	000	3
AVG STAY	4.67	(מ
Į Š	က	7	-
MD_ID VOL STAY		0000	7777

AVG	800	
AVG	808	1200
AVG ATAV	5 5	2
VOL	က	-
QI QIM		4444
AVG PYNT	950	1000
AVG COST	006	900
AVG STAY	9	2.5
NOL	2	2
MD_(D	3333	
AVG PYMT	1133	200
AVG COST	4.67 1000 1133	900
AVG STAY	4.67	က
TO	3	-
		22

FIG. 5

5/8

CREATE VIEW INPT_GRP_BY_MD
SELECT (CASE WHEN MD_ID = user-id THEN MD_ID ELSE NULL END) MD_ID,
COUNT(*) VOL,
AVG(STAY) AVG_STAY, AVG(COST) AVG_COST, AVG(PYMT) AVG_PYMT
FROM INPT_BASE GROUP BY MD_ID ORDER BY AVG_STAY DESC;

FIG. 6

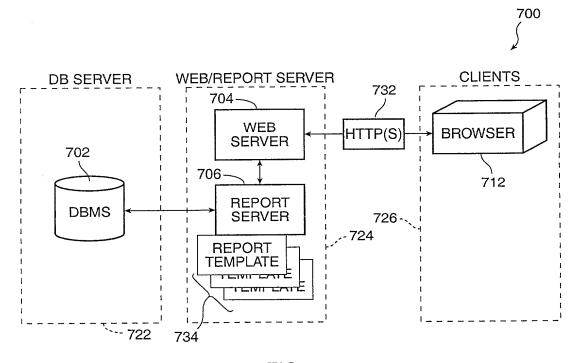


FIG. 7

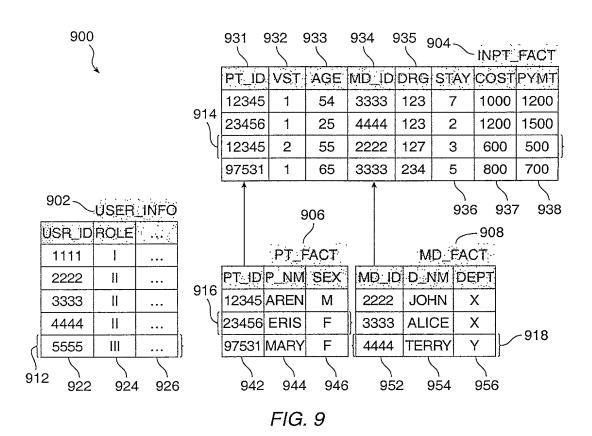
Access Level	Role	Access Policy
1	Executive	Access to all data.
11	Medical Doctor	Access to doctor's own patient visit data only. The patient privacy information of the other patient visit data should be blinded. The other medical doctor's privacy information should be also blinded.
III	Financial Analyst	Access to financial information without any medical doctor's information.

FIG. 8

H

16869B-017410US
Atty: George B. F. Yee, Reg. No. 37,478
Telephone: 650-326-2400
Cell-Level Data Access Control Using User-Defined Functions
Inventors: Shinji Fujiwara et al.
Sheets of drawing: 6 of 8

6/8



```
CREATE OR REPLACE PACKAGE BODY < schema name>.MASK IS
  FUNCTION P_NM(KEY_PT_ID NUMBER, KEY_VST NUMBER, ORG P NM VARCHAR2)
    RETURN VARCHAR2
                             1002
  IS
                                                     1004
  BEGIN
    /* Policy logic to decide whether or not we should mask the P_NM
    /* If we should mask the value, then return masked value. Otherwise,
1006 /* return the original value.
    IF <policy_codition> 1008
       THEN RETURN ORG P NM;
                   /* Original Value */
       ELSE RETURN MASKED P NM (ORG P NM);
                  \int /* Masked value defined by default mask value function */
   (END IF;
              1010
  END P NM;
END MASK;
```

1000

FIG. 10

16869B-017410US Atty: George B. F. Yee, Reg. No. 37,478 Telephone: 650-326-2400 Cell-Level Data Access Control Using User-Defined Functions Inventors: Shinji Fujiwara et al. Sheets of drawng: 7 of 8

7/8

```
SELECT c.PT_ID,
i.VST,
p.P_NM,
p.AGE, p.SEX,
i.MD_ID,
m.D_NM,
i.DRG, i.STAY, ...
FROM INPT_FACT i, MD_FACT m, PT_FACT p
WHERE i.PT_ID=p.PT_ID AND i.MD_ID = m.MD_ID AND ...;
```

FIG. 11

FIG. 13

The time that the time that the

16869B-017410US Atty: George B. F. Yee, Reg. No. 37,478 Telephone: 650-326-2400 Cell-Level Data Access Control Using User-Defined Functions Inventors. Shinji Fujiwara et al. Sheets of drawing: 8 of 8

8/8

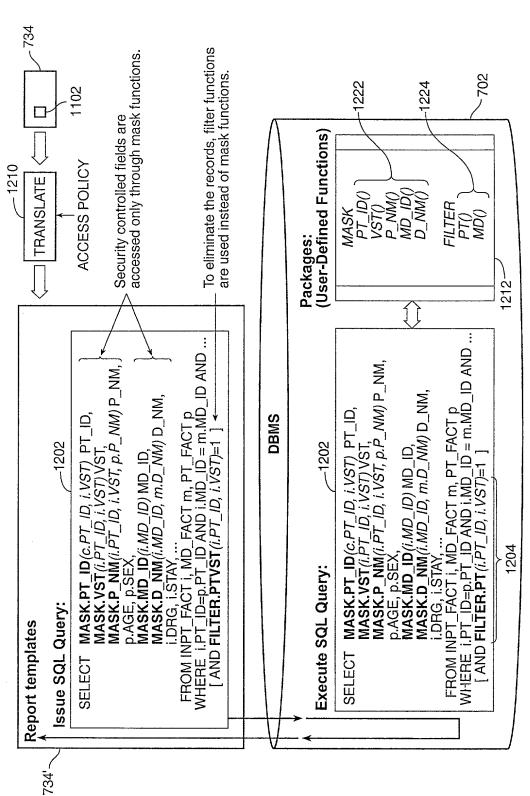


FIG. 12